Structural Response And Earthquake Estimation With Limited Acceleration Measurements Considering Material Nonlinearity, Friction And Pounding

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Post-earthquake structural assessment is essential for quick recovery after severe earthquakes and to ensure service continuity after medium earthquakes. Displacement is an important index to evaluate structural conditions. When the earthquake input to a structure is not available, estimation of structural state and the unknown earthquake is done using measured structural responses as an inverse problem. This paper uses an unscented Kalman Filter for unknown input for joint input-state estimation for nonlinear dynamic systems. Structural absolute accelerations at limited points in the structure are used as measurements. Material Nonlinearity is considered along with pounding and friction. Bouc-Wen models are developed to evaluate Material nonlinearity and friction. Pounding is analyzed by Hertz-Damp Model. The target structure to verify the proposed method in this paper is the shinkansen viaduct.